JACKSONVILLE HARBOR NAVIGATION STUDY

Duval County, Florida

Public Meeting

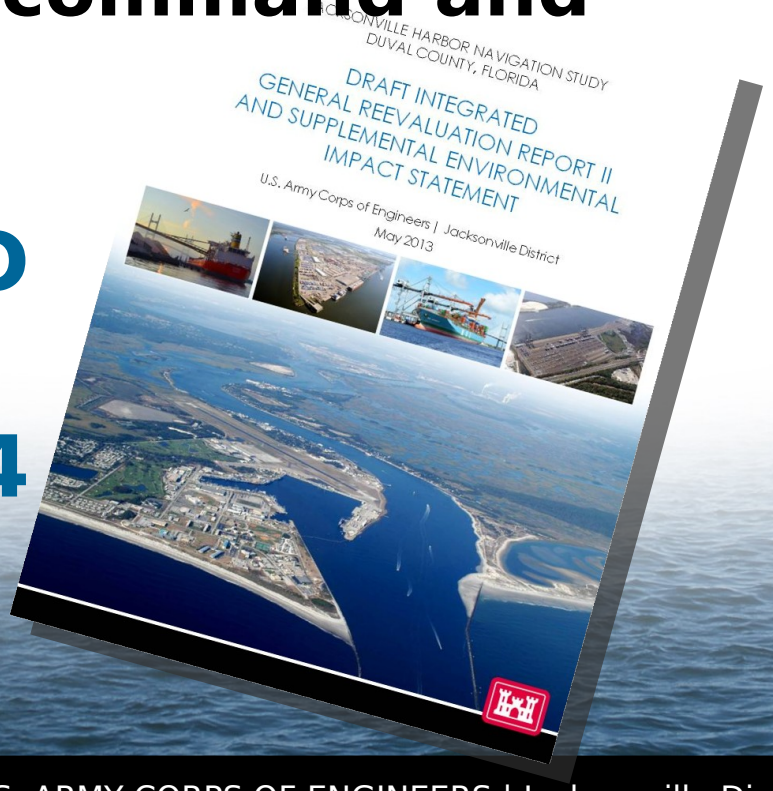
September 24, 2013

PUBLIC INVOLVEMENT UPDATE

- ~ 300 emails, letters, and phone calls received on the draft report

- All will be forwarded with the draft report to our chain of command and Congress

COMMENT PERIOD EXTENDED UNTIL OCTOBER 24



PROJECT IMPLEMENTATION

Key Dates:

- **October 24, 2013: Public and Agency Comments Due**
- **January 2014: Civil Works Review Board**
- **April 2014: Chief of Engineer's Report**
- **2016: Begin Construction Pending Authorization and Appropriations**

Construction Duration:

- **Approximately 4-6 Years**

MAYPORT NAVAL STATION
MILE POINT
BLOUNT ISLAND
DAMES POINT
YOU ARE HERE

PURPOSE

- ✓ **Reduce Navigation Transportation Costs**
- ✓ **Reduce Navigation Constraints (one-way traffic areas)**
- ✓ **Accommodate Larger Vessels**
- ✓ **Develop an Environmentally Acceptable Recommended Plan**

PROJECT OVERVIEW

Deepen to 47 feet from the entrance channel to ~ River Mile 13

Widen at Training Wall Reach and St. Johns Bluff Reach

Turning Basins at Blount Island and Brills Cut

ECONOMICS OVERVIEW

Why we do economic analyses

What is National Economic Development (NED)?

NED and Jacksonville Harbor

Why is 45’ the NED Plan?

WHY WE DO ECONOMIC ANALYSES

Why?: To determine <u>Federal Interest</u> in navigable waterway improvements

Federal Interest in Navigation improvements:

- U.S. Constitution
- Linkage to navigable waterways

Navigation Project Purpose:

- Move people, freight
- Facilitate commerce

How is Federal Interest Determined?

► National Economic Development (NED)

[The Congress shall have power]

To regulate commerce with foreign Nations, and among the several States, and with the Indian Tribes –

NATIONAL ECONOMIC DEVELOPMENT (NED)

NED = contribution to national value of goods and service

- **NED Benefit = Positive contribution**
- **NED Cost = Negative contribution**

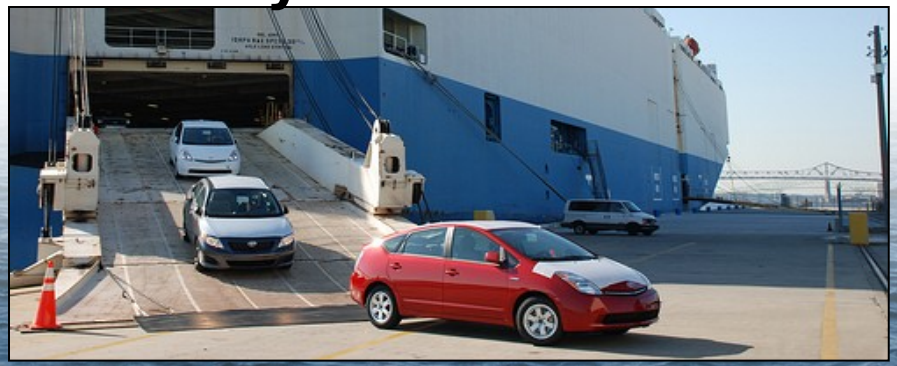
Unit of measurement: Benefits and costs expressed in dollars

Benefit to Cost Ratio (BCR)

- **NED Benefits/NED Costs**
- **BCR must exceed 1 to be authorized**

NED Plan = plan that most reasonably maximizes net NED

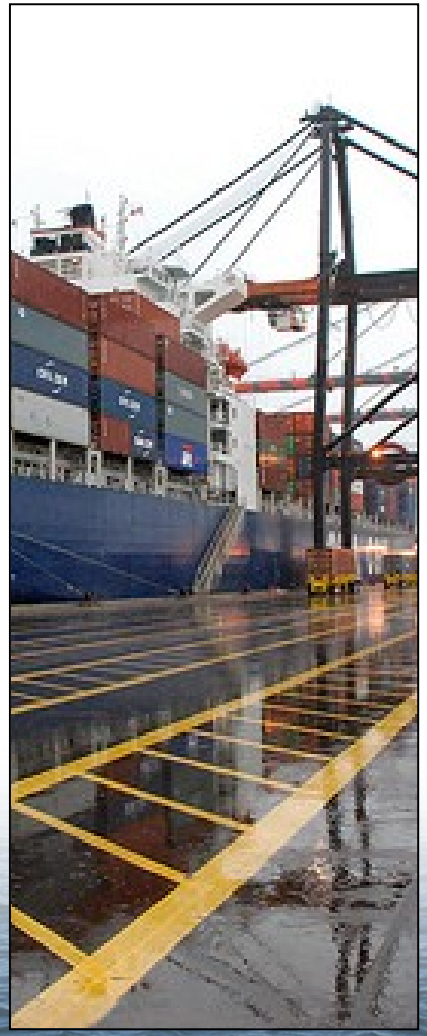
Benefits



NATIONAL ECONOMIC DEVELOPMENT (NED)

- **NED does not consider:**
  - **Local and regional job creation**
  - **Competition amongst regional ports**

NED & JACKSONVILLE HARBOR



HarborSym Model used

NED Benefits of the Project:

- Vessels use capacity more efficiently
- Cargo can be moved on a smaller number of larger, more technologically advanced vessels
- Reduced exposure to tidal delay

NED Benefits > NED Costs

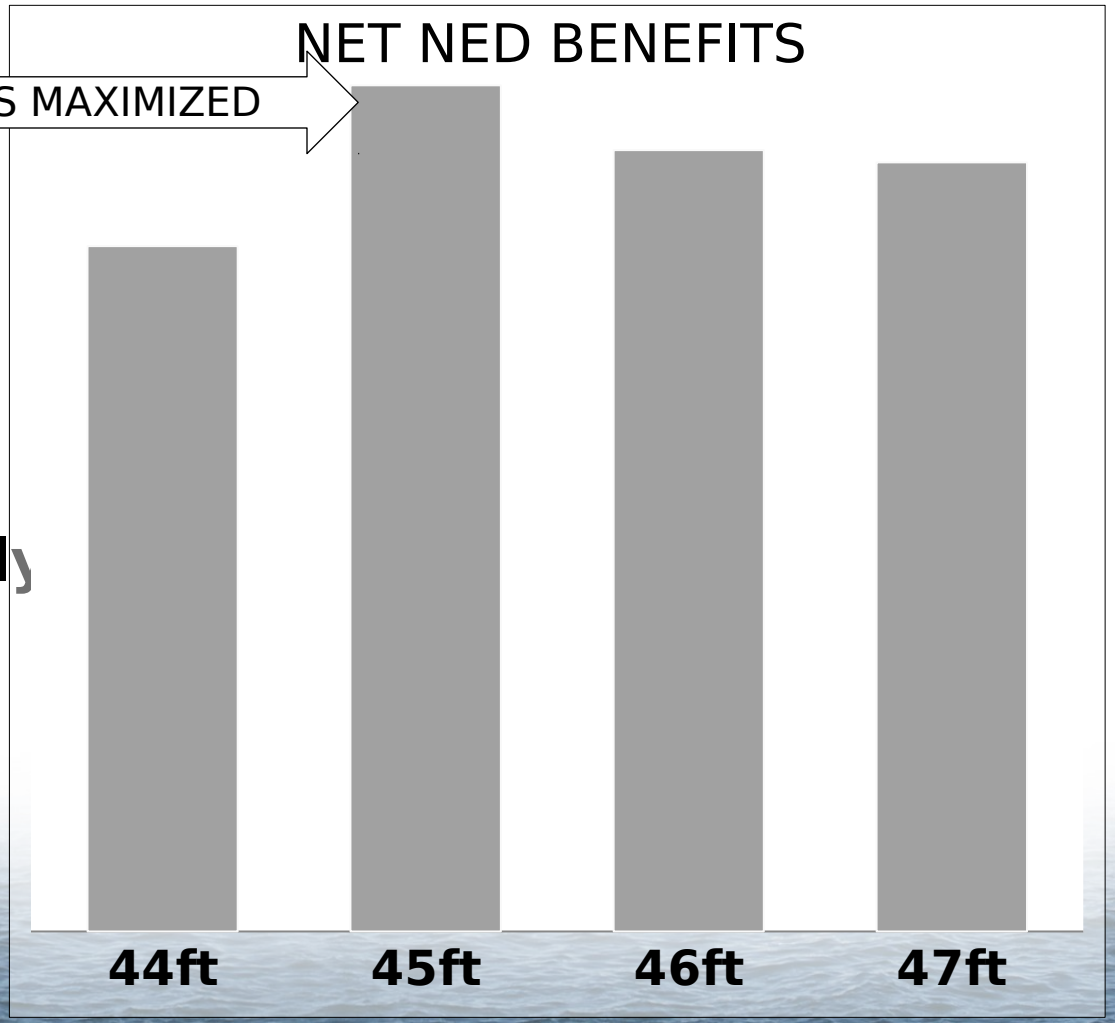
Deepening Jacksonville Harbor:

- Contributes to reduction in opportunity cost of trade
- Trade = major contributor to national output
- Therefore, contributes an increase to net value of national output

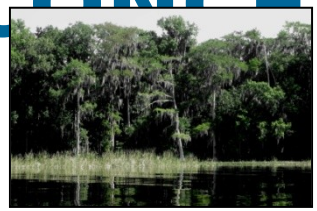
WHY IS 45 FEET THE NED PLAN?

45 feet Maximizes net NED benefits

47 feet is economically justified



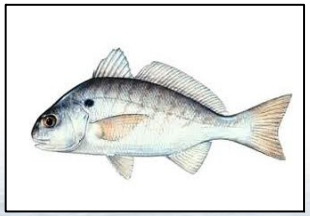
ENVIRONMENTAL ISSUES AND CONCERNS



Status of the environmental models, and providing results for public review

Credentials of the salinity and ecological models

Salinity effects within the main stem and tributaries



Mitigation for salinity effects

Environmental Monitoring and Adaptive Management (Corrective Action)

ENVIRONMENTAL MODELS COMPLETED

All Results Are On The USACE Website

- ☑ **Main Stem Salinity Modeling (EFDC)**
- ☑ **Main Stem Ecological Modeling**
  - **Eelgrass, Wetlands, Fish and Macroinvertebrates (Shrimp)**
- ☑ **Tributary and Salt Marsh Salinity Modeling (MIKE21)**
- ☐ **ADCIRC Modeling: Water Level Effect on Salt Marsh**
  - **Report will be posted by September 30**
- ☐ **Water Quality Modeling**
  - **Report will be posted by September 30**

SALINITY MODEL CREDENTIALS (EFDC; MIKE21)

- **Environmental Protection Agency (EPA): "(EFDC) has evolved over the past two decades to become one of the most widely used and technically defensible hydrodynamic models in the world."**
- **Both EFDC and MIKE models have undergone extensive worldwide reviews, documentation, and applications by research institutions, governmental agencies, and consulting organizations**
- **Examples of the modeling applications:**

  EFDC : St. Johns River Total Maximum Daily Load Study; SJRWMD Water Supply Impact Study; Savannah and Charleston Deepening Studies

  MIKE : New York and New Jersey Harbor

ECOLOGICAL MODEL CREDENTIALS

(Eelgrass, Wetlands, Fish, Macroinvertebrates)

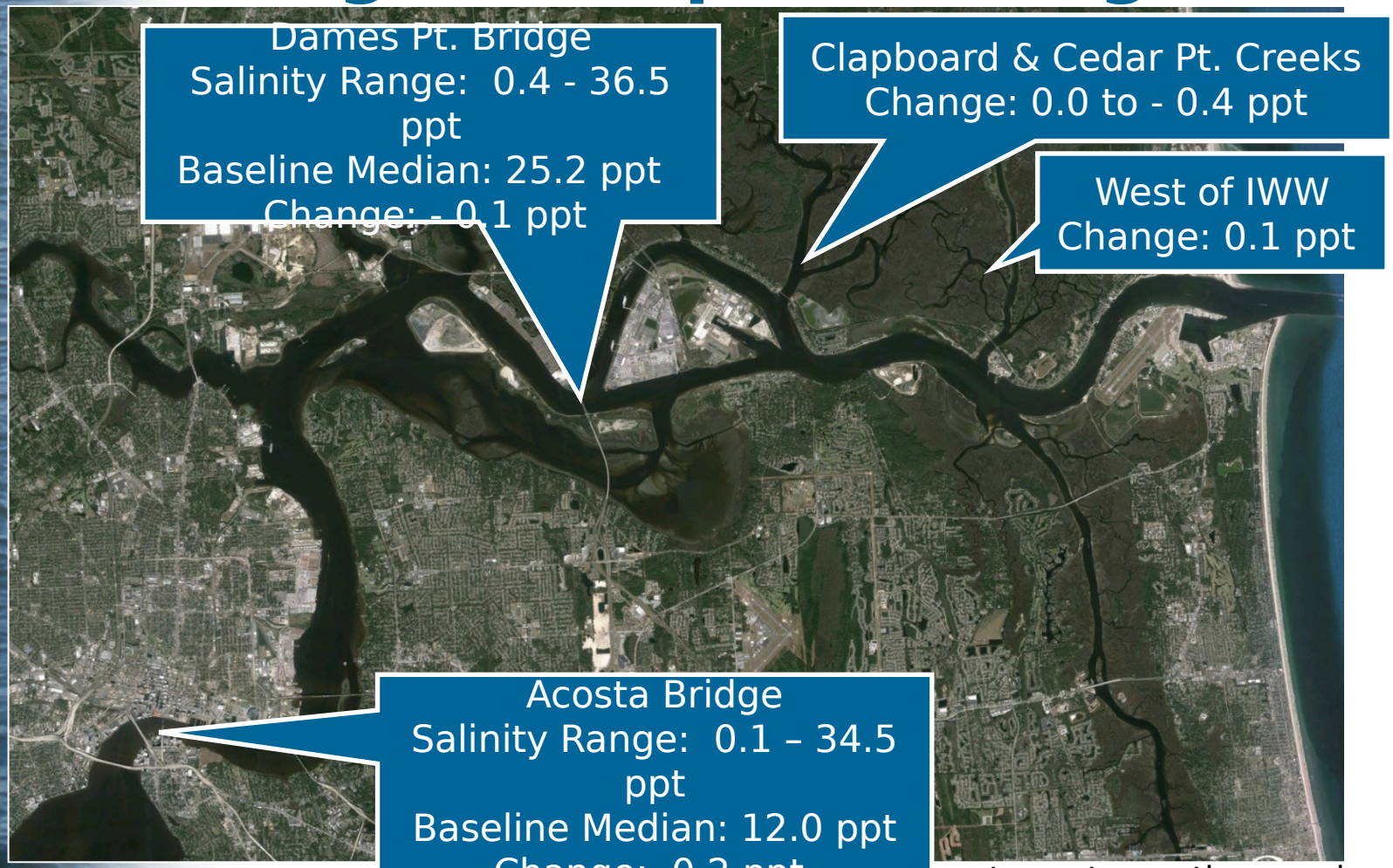
Developed specifically for the St. Johns River by SJRWMD senior scientists

Adapted for the deepening study with the help of agencies and academia

MODEL REVIEW (Credentials)

- Regulatory and Resource Agencies
- Recognized Experts on Eelgrass, Wetlands, Fish, and Macroinvertebrates
- Independent External Peer Review
- USACE District Quality Control
- USACE Environmental Center of Expertise
- USACE Agency Technical Review
- Public Review

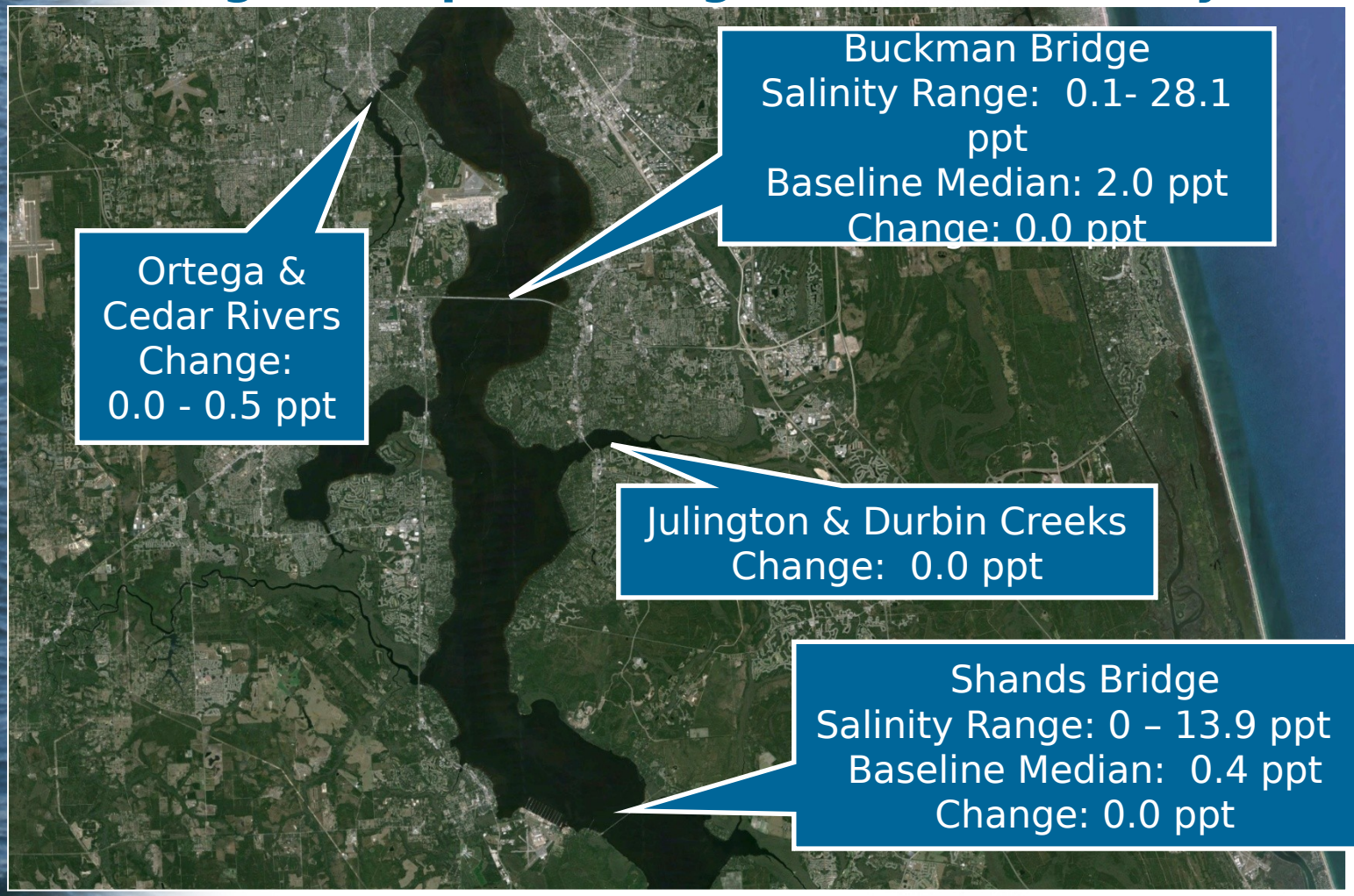
OVERVIEW OF LOWER STUDY AREA SALINITY RESULTS (Change in Depth-Averaged


Dames Pt. Bridge
Salinity Range: 0.4 - 36.5 ppt
Baseline Median: 25.2 ppt
Change: - 0.1 ppt
Clapboard & Cedar Pt. Creeks
Change: 0.0 to - 0.4 ppt
West of IWW
Change: 0.1 ppt
Acosta Bridge
Salinity Range: 0.1 – 34.5 ppt
Baseline Median: 12.0 ppt
Change: 0.2 ppt

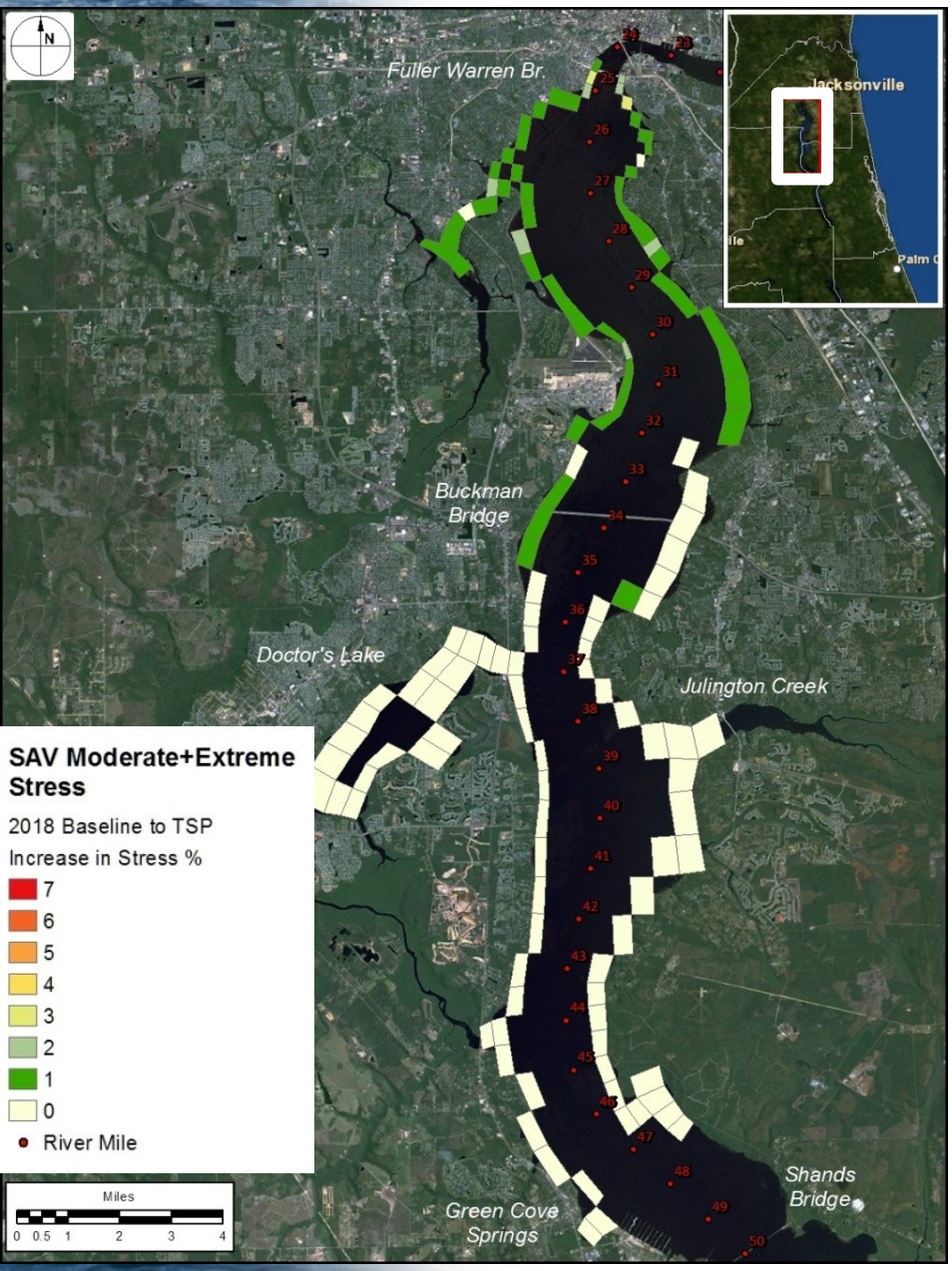
ppt: parts per thousand

OVERVIEW OF UPPER STUDY AREA SALINITY RESULTS

(Change in Depth-Averaged Median Salinity)



ppt: parts per thousand

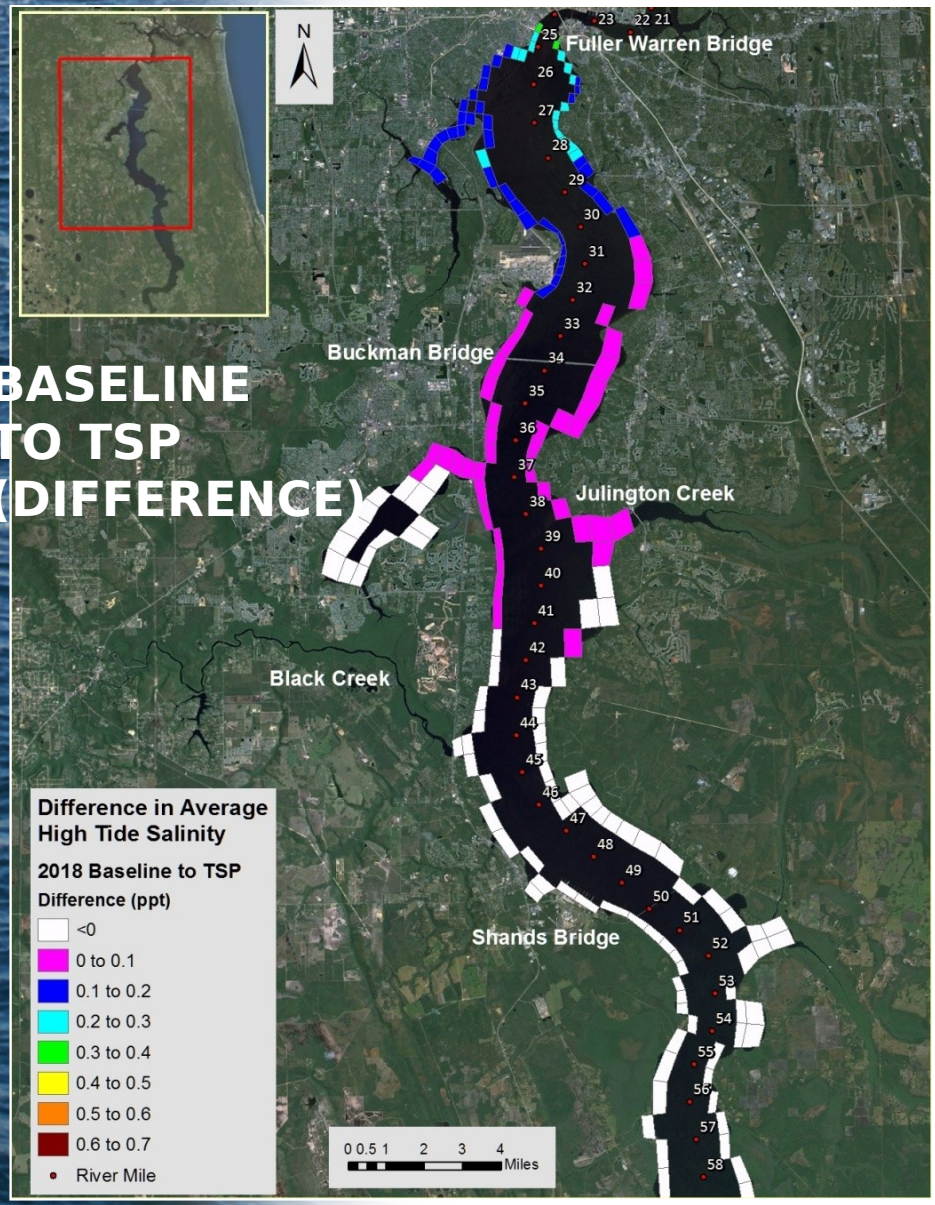


ECOLOGICAL MODE

SAV (Eelgrass): Increase in Salinity Stress Frequency

From 2018 Baseline to 2018 TSP(47ft)

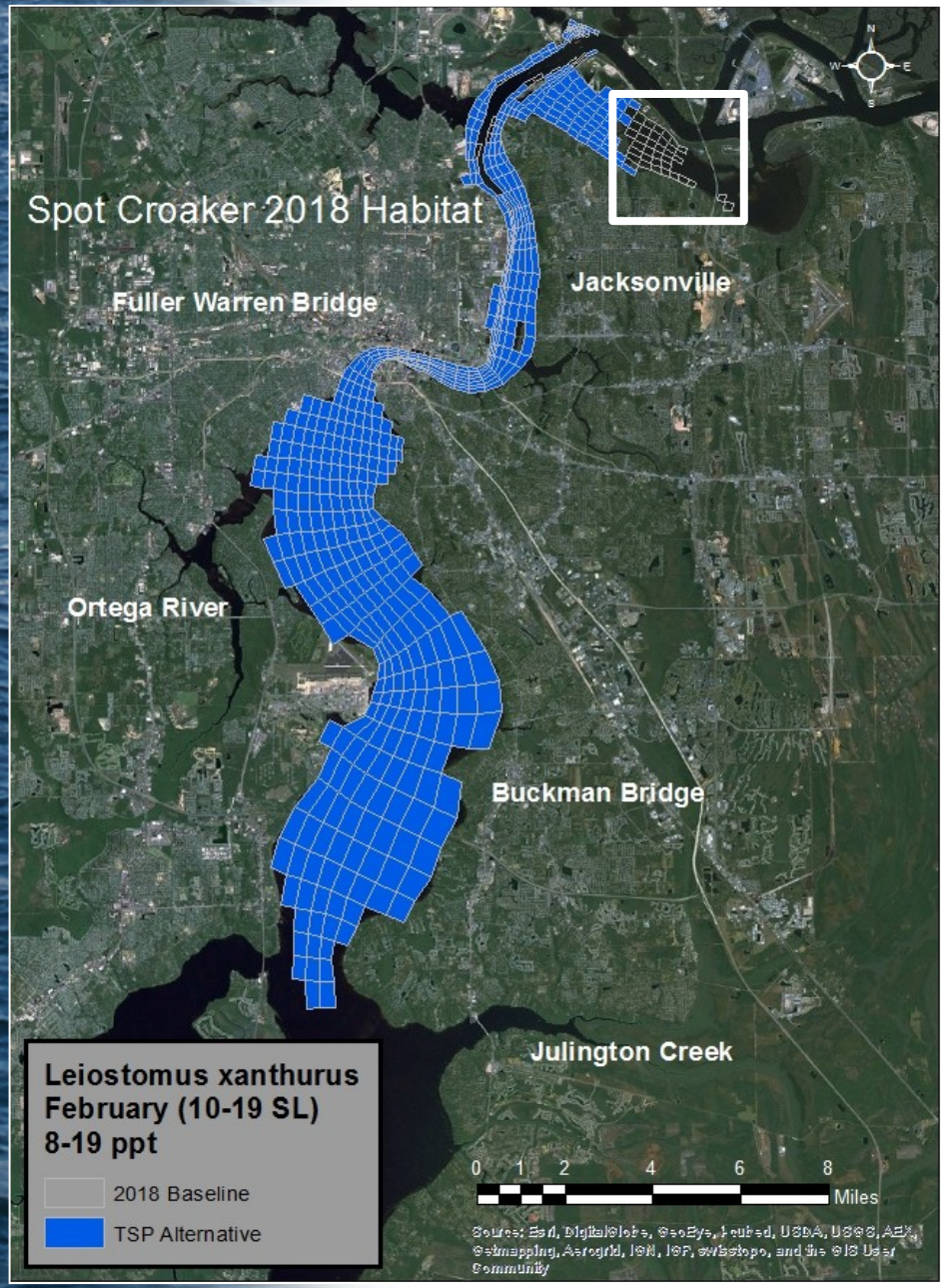
River Mile	Eelgrass Bed Extent (Baseline)	Eelgrass Bed Stress Condition (Baseline)	Difference from Baseline to TSP
24.5 – 26	Very Sparse	Stressed	1 - 3%
26-31	Sparse	Stressed	0 - 2%
31-35	Persistent	Stressed	0 - 1%
35-36	Persistent	Stressed	0 - 1%



ECOLOGICAL MODEL

Wetlands: Difference in Average High Tide Salinity

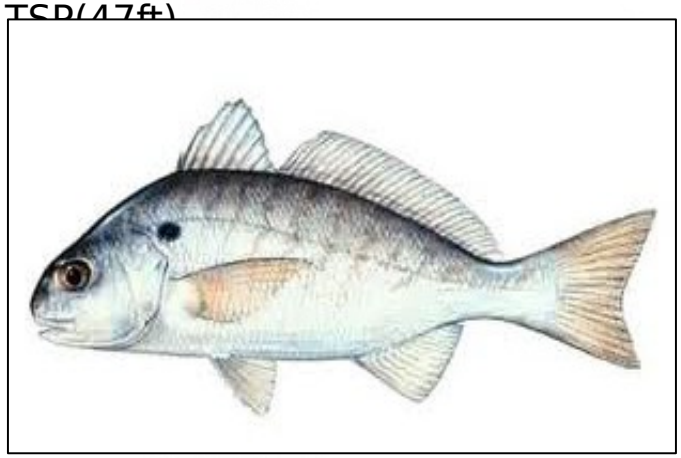
From 2018 Baseline to 2018 TSP(47ft)



FISH MODEL

Difference in Salinity-based Habitat

From 2018 Baseline to 2018 TSP(47ft)



Typical Example

SUMMARY OF SALINITY AND WATER LEVEL IMPACTS

EELGRASS

1%-3% increase in stress frequency between Acosta and Buckman Bridges
No beds would disappear because of the deepening

WETLANDS

- Due to minor changes in salinity, wetlands would not significantly change due to deepening
- Deepening may contribute in a small way to ongoing changes in
plant composition and soil subsidence
- Proposed deepening would not cause changes in water level that would affect salt marsh or other wetlands
- Rising sea level will cause water level and salinity changes in the river that will have much greater impact than the deepening

FISH AND MACROINVERTEBRATES

- 0-8% change in salinity-based habitat for some fish and shrimp

RECOMMENDED BASE MITIGATION PLAN

Acquisition of lands for conservation:

- **Freshwater Conservation Area**
  - **~595 acres identified for purchase for both eelgrass and wetland effects**

- **Salt marsh Conservation Area**
  - **~44 acres identified for purchase for fisheries effects**

Specific conservation parcels will be designated upon the appropriation of final project funding and coordination with the appropriate resource agencies.

USACE continues to coordinate with regulatory agencies on other mitigation options such as wetland and eelgrass restoration projects.

MONITORING

USACE proposes a long-term monitoring plan to include:

- **Placement of water quality monitoring stations in the main stem and selected tributaries**
- **Eelgrass, wetlands, and fisheries monitoring**
- **Additional modeling to help determine causes of any observed changes**

ADAPTIVE MANAGEMENT PLAN
(Corrective Action)

Addresses environmental risk and uncertainty

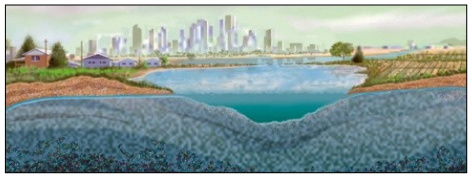
Establishes numeric salinity and biological thresholds that would trigger modeling and mitigation actions

Outlines path forward should additional salinity changes occur as a function of the deepening project beyond that mitigated for

ADAPTIVE MANAGEMENT/ CORRECTIVE ACTION PLAN

*** INCLUDES MORE MITIGATION**

ENGINEERING OVERVIEW

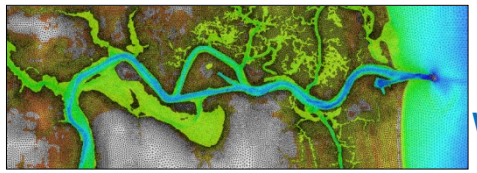


Groundwater Analysis

Are there impacts to the aquifers?

Air Draft Restrictions

Will new ships fit under power lines and Dames Point Bridge?

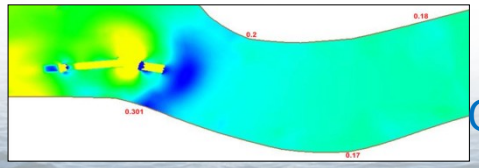


Storm Surge Analysis

Will the project increase water surface elevations during a storm?

Shoaling Analysis

How much additional material for future maintenance dredging?

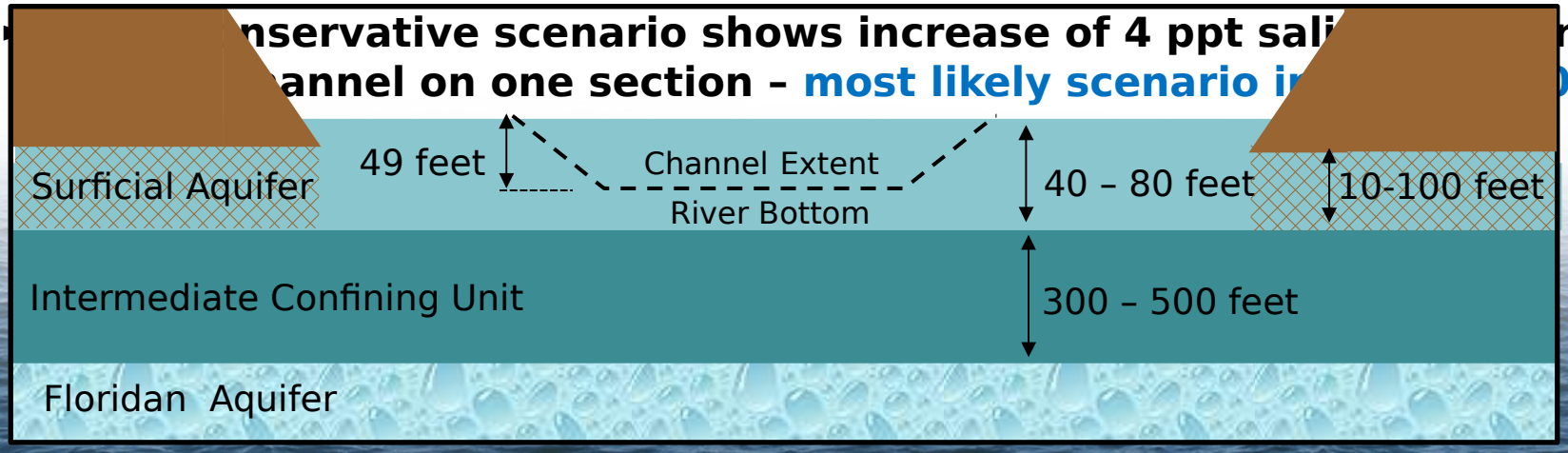


Shoreline Erosion

Changes to river dynamics as a result of construction & operations?

GROUNDWATER ANALYSIS

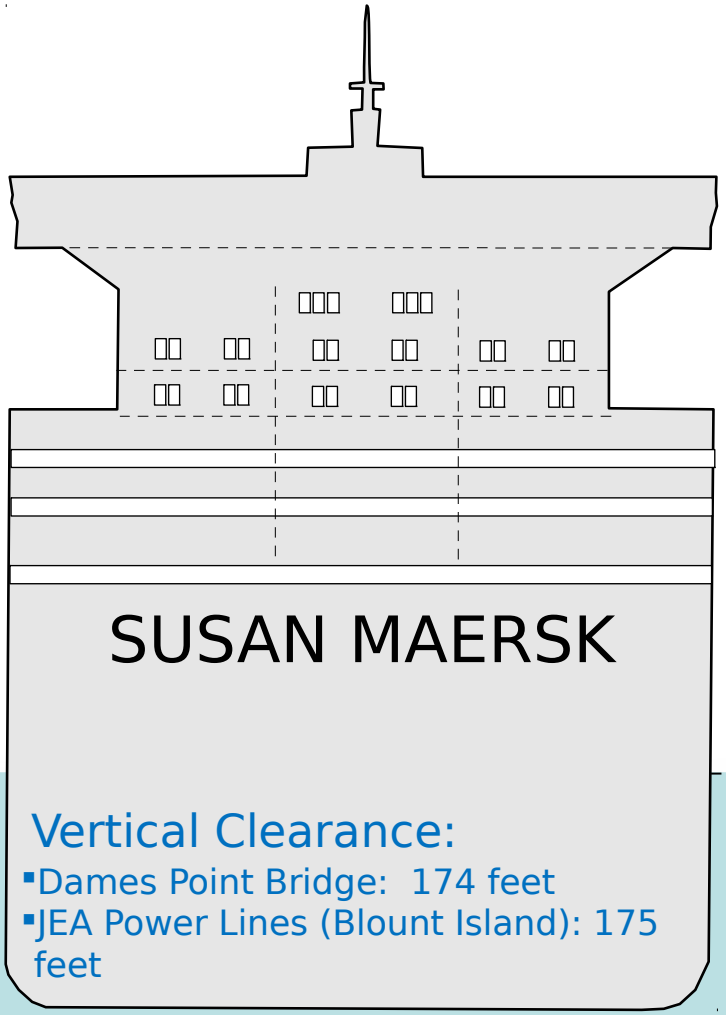
- **No impact to Floridan Aquifer (primary drinking water source for area)**
- **USGS Groundwater Model – Surficial Aquifer**
  - **Little to no affect to surficial aquifer and only in areas likely to be impacted by existing conditions**
  - **Cross sections generated based on available data at four locations along the channel**
  - **Cross sections located at residential areas most likely to use surficial aquifer**
  - **Four possible geologic scenarios tested at each location**
  - **nservative scenario shows increase of 4 ppt sali n 75 annel on one section – most likely scenario i .2**



GROUNDWATER ANALYSIS

PROXIMATE LOCATIONS OF EXISTING RIVER DEPTHS

AIR DRAFT RESTRICTIONS



TOP OF MAST

Constructed Height of Vessel (199 feet)

Air Draft for Operating Range (167 feet to 155 feet)

WATER LEVEL

Normal Operations Draft (32 feet to 44 feet)

BOTTOM OF VESSEL

Vertical Clearance:

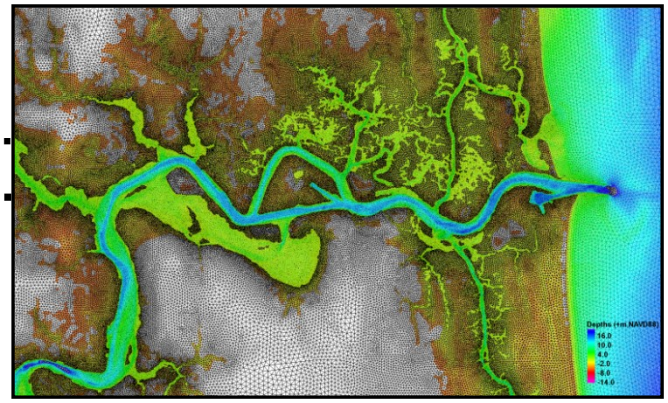
- Dames Point Bridge: 174 feet
- JEA Power Lines (Blount Island): 175 feet

Information courtesy: Maersk

STORM SURGE & SEA LEVEL CHANGE ANALYSIS

Based on:

- **FEMA Storm Surge Study Mesh**



Mesh resolution:
Minimum element size ~ 100 feet

Storm Surge/ Sea Level Change Scenarios			
Scenario	Channel Depths	Sea Level Rise (SLR)	Storm Event
1	2068 FWOP	0.4 ft	50-yr
2	2068 FWOP	0.4 ft	100-yr
3	2068 TSP 47 ft	0.4 ft	50-yr
4	2068 TSP 47 ft	0.4 ft	100-yr
5	2068 FWOP	1 ft	50-yr
6	2068 FWOP	1 ft	100-yr
7	2068 TSP 47 ft	1 ft	50-yr
8	2068 TSP 47 ft	1 ft	100-yr
9	2068 FWOP	2 ft	50-yr
10	2068 FWOP	6 ft	50-yr

FWOP: Future Without Project

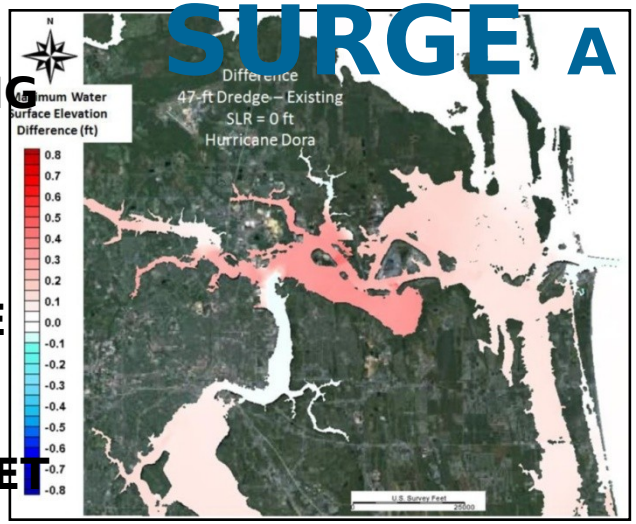
PROJECT IMPACT ON STORM SURGE

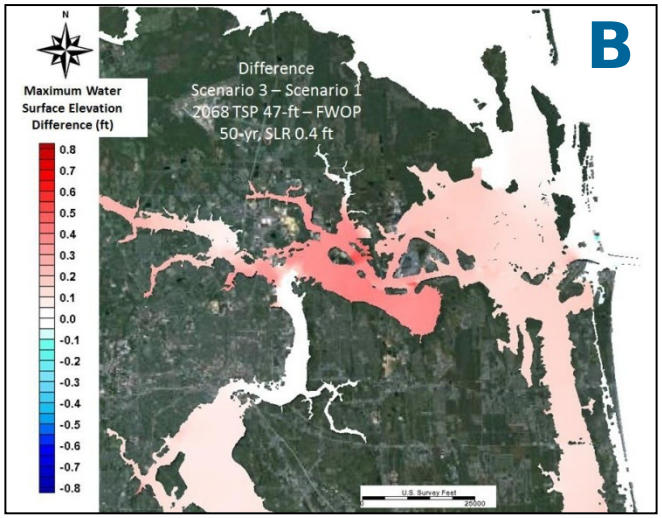
A

DIFFERENCE BETWEEN
47-FOOT TSP AND EXISTING
- **SEA LEVEL RISE = 0**
- **HURRICANE DORA**

B

DIFFERENCE BETWEEN
47-FOOT TSP AND FUTURE
WITHOUT PROJECT
AT YEAR 2068
- **SEA LEVEL RISE = .4 FEET**
- **50-YEAR STORM EVENT**

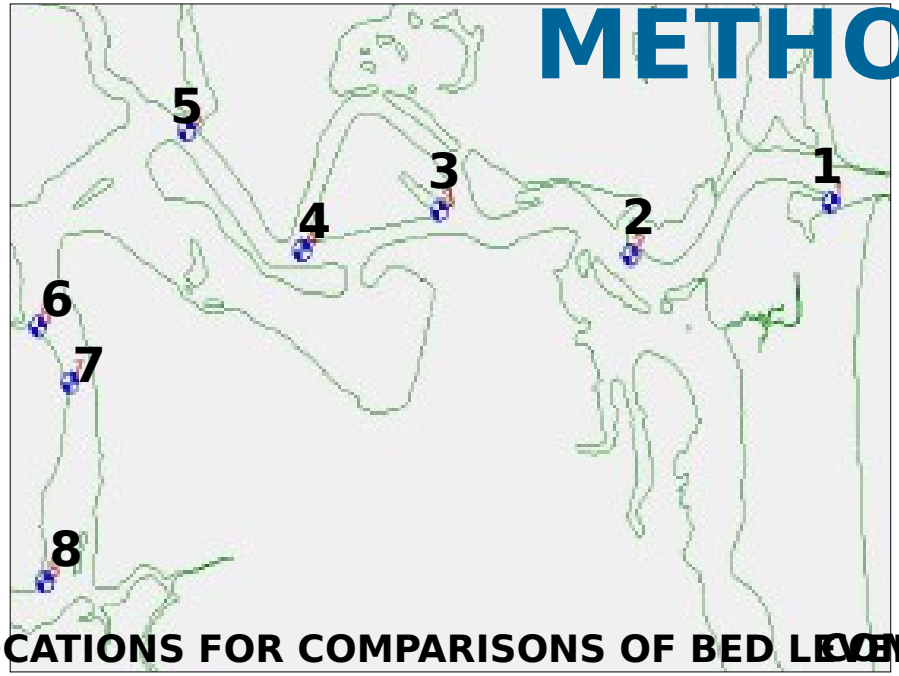




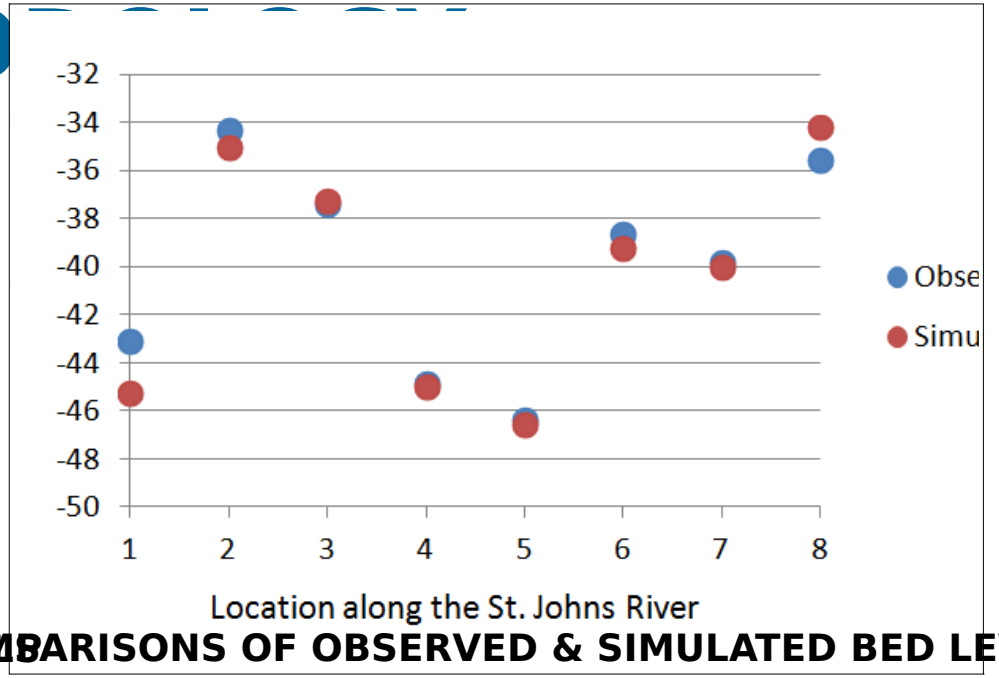
PROJECT AND SEA LEVEL CHANGE MAXIMUM WSE (FEET-NAVD88)

SCENARIOS	Mayport		Dames Point Bridge		Trout River		San Marco	
	Max WSE (ft)	Diff (ft)	Max WSE (ft)	Diff (ft)	Max WSE (ft)	Diff (ft)	Max WSE (ft)	Diff (ft)
SCENARIO 1 [2068 FWOP, 50-yr, 0.4'SLR]	8.01		6.57		7.82		7.59	
SCENARIO 3 [TSP 47', 50-yr, 0.4'SLR]	8.15	0.14	6.86	**0.29**	7.90	0.08	7.65	0.06
SCENARIO 2 [2068 FWOP, 100-yr, 0.4'SLR]	10.41		9.04		11.41		10.04	
SCENARIO 4	10.53	0.12	9.31	0.08	11.60	0.18	10.12	0.08

SHOALING ANALYSIS - METHODOLOGY



LOCATIONS FOR COMPARISONS OF BED LEVELS



COMPARISONS OF OBSERVED & SIMULATED BED LEV

- AdH – Adaptive Hydraulics model (USACE certified)
- Used the AdH sediment transport module
- The model was calibrated and results compared well with observed data

SHOALING ANALYSIS - RESULTS

- **Modeling was performed to confirm the maintenance dredging requirement and to identify the advanced maintenance areas**
- **Historic Dredging Rates estimate a 17% increase in annual dredging volume**
- **Modeling results predict a 20% increase in annual dredging volume**

SHORELINE EROSION OVERVIEW

The St. Johns River is not a static entity – but rather highly dynamic and its banks are subject to erosion/accretion by a wide variability in conditions produced by the natural environment:

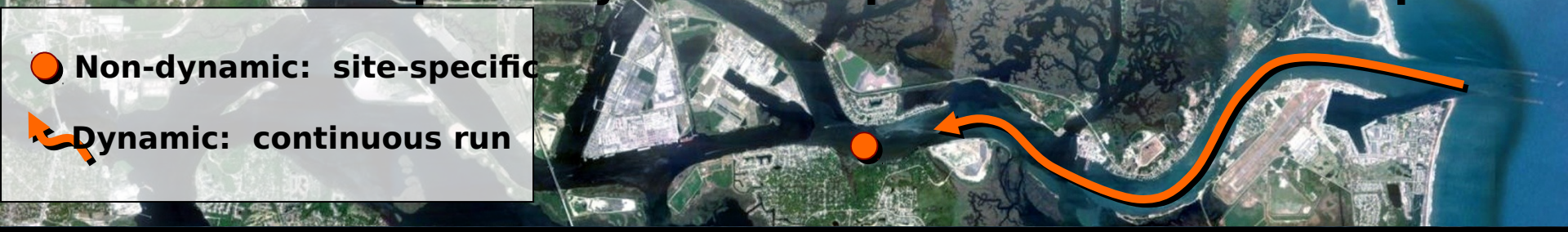
- **Major factors:**
  - **Underlying geologic conditions**
  - **Tidal range**
  - **Water currents**
  - **Wave climate (storms/wind and vessel wake)**
  - **Shoreline configuration/presence of structures**

FACTORS OF CONSIDERATION

SHORELINE EROSION

Comparison of the factors between existing conditions and the future project:

- **Effects of vessel operations:**
  - Conducted ship wake analysis (Non-Dynamic and Dynamic)
- **Effects of physical construction of the channel:**
  - Analysis of predicted changes in tidal range (~ 0.2 feet)
  - Current velocities
  - Side slope analysis of the predicted channel slopes



SHIP WAKE ANALYSIS (non-dynamic)

- **Large ships moving along confined deep channels cause a drop in water level followed by a resulting surge as the ship proceeds along the channel.**
- **The drop in water level is drawdown.**
- **We analyze vessel drawdown to quantify and understand the surge wave generated by the vessels that use the project.**

CHANNEL	DESIGN VESSEL	DRAWDOWN (FEET)
Existing 40-foot	**PANAMAX** at 37-foot draft	1.04
Existing 40-foot	**Post PANAMAX** at 37-foot draft	1.40
Deepened 47-foot	**PANAMAX** at 37-foot draft	0.28
Deepened 47-foot	**Post PANAMAX** at 44-foot draft	0.47

Our analysis indicates that, generally, vessel drawdown decreases with the project

Plot of Existing and With Deepening Project Cross-Section at the St. Johns Bluff Reach and a vessel speed of 7 knots at slack tide

SHIP WAKE ANALYSIS (dynamic)

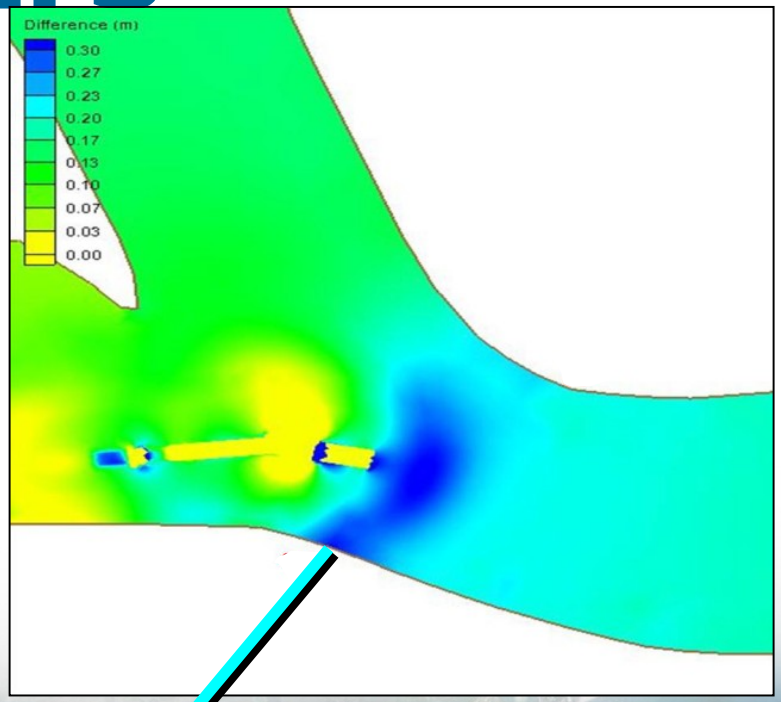
Mile Point / Maximum Differences	Stages (feet)
In Bound at High Water	Varies from -0.16 to 0.19
Out Bound at High Water	Varies from -0.13 to 0.10
In Bound at Low Water	Varies from -0.79 to 0.23
Out Bound at Low Water	Varies from -0.39 to 0.13
In Bound against Maximum Current	Varies from -1.41 to 0.08
Out Bound with Maximum Current	Varies from -1.05 to 0.07
St. Johns Bluff / Maximum Differences	**Stages (feet)**
In Bound at High Water	Varies from -0.07 to 0.30
Out Bound at High Water	**Varies from -0.03 to 0.98**
In Bound at Low Water	Varies from -0.72 to 0.16
Out Bound at High Water	Varies from -0.59 to 0.02
In Bound against Maximum Current	Varies from -1.57 to 1.25
Out Bound with Maximum Current	Varies from -0.95 to -0.13

Summary of the Minimum and Maximum Water Stage Differences Between the Existing and With-Project Conditions Due to Ship Passage

- **Water stages associated with ship passage tend to decrease with the project**
- **Results depend on location in river, local bathymetry, and whether ship is running with or against tidal currents**
- **Maximum increases in water surface elevation occur along St. Johns Bluff Reach**

SHIP WAKE ANALYSIS RESULTS

- **Maximum ship wake increase of 1 foot occurs on south bank; average increase is 4 inches**
- **Maximum occurs for less than 60 seconds**
- **Occurs when fully loaded design vessel (SUSAN MAERSK) is outbound against flood tide at high water**



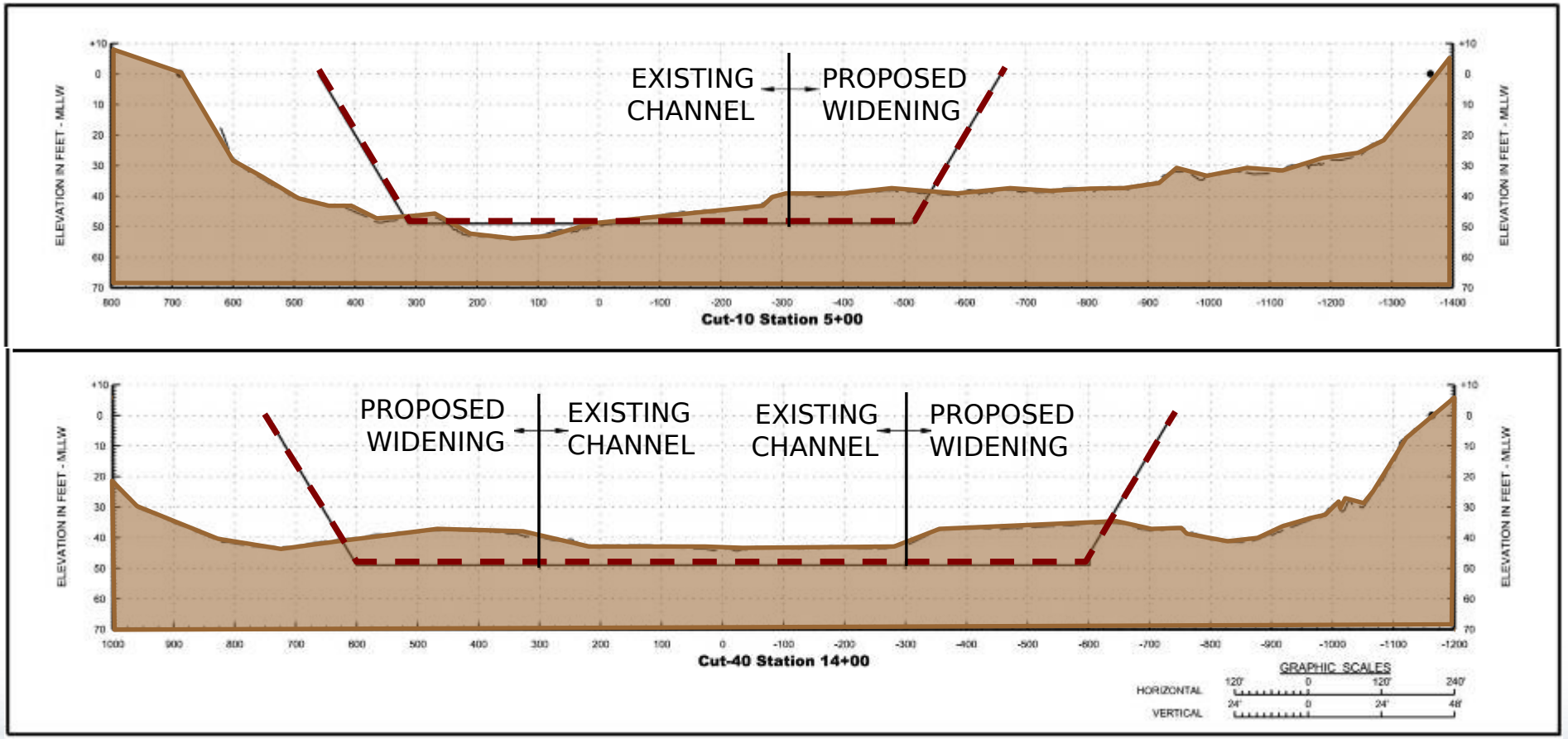
PREDICTED CHANGES IN CURRENT VELOCITIES

COMPARISON OF OVERALL CURRENTS (FT/S) FOR THE EXISTING AND 47-FT DEPTH CONDITIONS IN THE CHANNEL

Location	Existing condition			With-project (47-ft depth) condition		
	Minimum	Maximum	Average	Minimum	Maximum	Average
1	0.006	4.69	1.61	0.02	4.66	1.59
2 (Mile Point)	0.07	3.86	1.50	0.06	4.05	1.53
3 (Ramoth)	0.02	4.09	1.65	0.00	3.38	1.29
4 (Blount)	0.06	2.00	0.85	0.04	1.76	0.69
5	0.001	2.16	0.94	0.005	1.87	0.76
6	0.01	2.30	0.99	0.01	2.97	1.18

- **Maximum and average currents tend to decrease throughout the project**
- **Average currents range from a decrease of 0.36 feet/second to an in of 0.2 feet/second**

SIDE SLOPE ANALYSIS



APPROXIMATE SHORELINE

EXISTING GROUND

DREDGE TEMPLATE

NOTE: SHORELINE FALLS OUTSIDE LIMITS OF SECTION ON SECTIONS WHERE APPROXIMATE SHORELINE SYMBOL IS NOT SHOWN.

We have performed a cross sectional analysis every one hundred feet along the river for the length of the project.

PUBLIC COMMENTS

Public comments are due October 24, 2013

Please send all comments to:

Attn: Paul Stodola
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019
(904)232-3271
Paul.E.Stodola@usace.army.mil

The Draft Jacksonville Harbor General Reevaluation Report I (GRR2) and Supplemental Environmental Impact Statement (SEIS) can be found at the following locations:

Library Locations: Main, Highlands, Mandarin, Regency

Online:

http://www.saj.usace.army.mil/Missions/CivilWorks/Navigation/NavigationProjects/JacksonvilleHarborChannelDeepeningStudy.aspx